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vanished, yet the phenomena I have described were seen from quite a distance, although if I moved about the streamers changed in relative brilliancy. I have many times thought of this appearance when I have looked over published reports of auroræ from voluntary observers, and it may be well to show that all unusual night-lights are not auroræ.

From Dr. Hatch's proximity to the lamp, "about the angle of 60° to the burner" (is this altitude, zenith distance, or an angle measured from some street lines?), it may be possible that his phenomenon has some relation to the halos which may be frequently seen around the arc lamps here. When near the lamps the halo is small and, under proper atmospheric conditions, very brightly colored; at a greater distance the halo is larger but the colors not so distinct. In either case if you can witness the upper half of this halo *as if it were on the celestial sphere*, you will have a large "luminous arch" "consisting of pencils of light radiating upward from a dark arc, . . . the pencils constantly changing in length, and having an apparent movement laterally" if the head is moved in the least while noting different portions of the arch. The "coloration of the pencils" will be also "unmistakable." See Dr. Hatch's reply to Professor Hazen in *Science* for Jan. 20, 1893.

GEORGE H. HUDSON.

Vice-Principal State Normal and Training School, Plattsburgh, N. Y.

Continuous Rain.

A REMARKABLE phenomenon was observed in the town of Athens, Ohio, late in the fall, which has awakened wide interest, viz., continuous rain during a succession of clear, beautiful days. This was noticed extending for a considerable distance just below the crest of a hill, and lasted through the day, from soon after sunrise till about sunset. The drops of water were at no time large, but they reached their maximum size about two or three o'clock in the afternoon.

The subject attracted the attention of professors in the Ohio University, and it was soon determined that the phenomenon must be due to the precipitation of vapor which had been carried through an old railroad cut for several hundred yards. There had recently been completed and set in operation extensive brick-works, where three large ovens were continually in operation, and from which hot currents of air steadily shot upwards. In the moulding of the bricks, water is mixed with clay, and an enormous amount of hot, watery vapor was passing into the air above the ovens, supplemented by large quantities from the stacks of a large "dryer," which was kept at a high temperature. It is estimated that in all fully forty-five tons of water were at this season daily evaporated.

The plant is situated in the valley of the Hockhocking River, close to a cut made many years ago for a projected railroad, and this cut leads directly to the rise of land where the observations were made. The observer at the University Weather Station reports that the prevailing wind was at this time in a direction such as would carry the hot air, laden with moisture, through this artificial passage. The air was, in all probability, carried partly up the hill and there dissipated along the side. About this time it must have come in contact with a cold current near the crest of the hill, and precipitation followed, causing this unusual rainfall. The conclusion that the precipitation was due to these causes is strengthened by the fact that not until the manufacture of bricks at this place was begun was any such phenomenon observed, so far as is known.

H. E. CHAPIN.

Ohio University, Columbus, Ohio.

Natural Selection at Fault.

IN the issue of *Science* for Jan. 20 there appears, under the above heading, an article from the pen of J. W. Slater. The conclusions there arrived at do not necessarily follow from the facts cited. That animals of the Felidae by tormenting and playing with their victims often lose their prey, which otherwise might have been devoured, is well known to every observer. The facts, however, that this is most frequently done by the younger animals, and generally at a time when they are not greatly in need of food, are overlooked. Besides, what seems to be the

most important consideration in the case, is that by means of this play that quickness and precision of motion so essential to success in procuring food are acquired, so that doubtless the gain in the end is much greater than the temporary loss occasioned by the accidental escape of a victim now and again.

In reference to the cackling of the hen, it may be that this animal has been so long domesticated that it is impossible to draw inferences with any degree of certainty from its conduct in this respect. Every house-wife, though, who has kept hens, is well aware that their cackle is very deceptive, that it is generally not commenced till they have got a little distance from the nest, and may, very likely, in most cases, serve to attract attention to themselves and away from their nests. Several of the wild birds that nest on or near the ground, when suddenly disturbed, escape in a manner evidently intended to attract attention to themselves and away from their brood. The action of the domestic hen may generally serve a similar purpose, and yet at times fail or even produce an opposite result.

Neither does it appear that the human ear is any more a case in fault. The principle of natural selection does not necessarily require the loss of a useless member unless it is positively injurious—a hindrance in the struggle for existance. The outer ear is not that; it may even serve a purpose. Writers on acoustic tell us that it serves to some extent to condense or concentrate the sound-waves. Even if it serves no other purpose than to improve the personal appearance, its retention would still be in perfect accord with the theory of natural selection.

Besides, it cannot be shown that the human ear is not now undergoing a process of atrophy. Grant that the outer ear has been of no use to our fathers for many generations, it would not necessarily follow that children of to-day should be born earless. All evidence goes to show that changes of this character are so gradual as to escape notice. The fact mentioned by Mr. Slater, that, owing to disuse, the outer ear has lost its power of motion so far supports the theory of natural selection. That the ear is not entirely gone, as he thinks it should be, may be due to its still being of service or to lack of sufficient time since it became useless.

RICHARD LEES.

Brampton, Ontario.

Leaf Impressions in the Eocene Tertiary of Alabama.

THOSE working geologists who are interested in what Professor Lester F. Ward¹ terms "The New Botany" may be somewhat surprised to learn that in the Eocene Tertiary strata of Alabama there is a promising and unexplored field for the paleobotanist. In fact there is reason to believe that a careful study of the plant-life existing in the Mississippi embayment during the well-marked subdivisions of the Tertiary will throw some light upon the knotty problems of the interior.

While the study by Lesquereaux of the Mississippi Lignite was of interest and affords the present main means of correlating the trans-Mississippi Tertiary with that of the Gulf Coast, the value of this work for this purpose is somewhat diminished by the doubts as to the exact age of the several horizons in which the leaf impressions occur. On the other hand, the geological section so accurately established for the Tertiary in Alabama affords a key for the critical solution of age-problems in the Gulf Region. Between beds of marine shells, whose faunal features have been determined with relation to kindred deposits on the Atlantic border, are beds of sandy clays containing well-preserved leaf impressions. These are found in the Lower Tertiary at Bells Landing on the Alabama River, where numerous dicotyledonous leaves occur in the stratum between the Bells² Landing and Greggs Landing marine shell beds. In the middle Tertiary of the Claiborne group both at the typical locality³ and on Barrows Mill Creek, a tributary of Conecuh River, Covington County, are extensive occurrences of fine fossil leaves.

The State Geological Survey of Alabama has some few specimens from each of these localities but no systematic collecting has been done and no determination of species has been made.

¹ Science, Vol. XXI., No. 521, p. 43.

² Bull. 43 U. S. Geol. Survey, 1887, p. 47.

³ Am. Jour. Sci., 3d Ser., Vol. 31, 1886, pp. 2-209.

The fact that the exact age of each horizon referred to is clearly established in the geological column should make these beds of particular interest to the paleobotanist and should contribute materially to our facilities in correlating the much-discussed Interior Tertiaries. DANIEL W. LANGDON, JR., F.G.S.A.

Cincinnati, Ohio.

Bowser's Mathematical Text-Books.

I HAVE just read a note on "Bowser's Trigonometry" by Professor Hodgkins in *Science* of Jan. 20. Permit me to add a few words on Bowser's series, both in the way of praise and criticism, and, therefore, favoring both sides of the question. I used his analytical geometry and calculus for two years with good results. They are well adapted to the average student in arrangement, examples, and general plan, and they are more modern than most text-books of the same class. But the subject is sometimes unnecessarily complicated, as in solid analytics, where the beauty of the method of direction-cosines is seriously marred. Also, in respect to the details of accuracy of statement and logical demonstration, I am sorry to class the series among the free and easy kind of which we have so many, although among the best of that kind. The public is as much at fault for accepting and even demanding books in that style as are the authors for writing them.

Let me illustrate by his treatment and use of the method of infinitesimals. That method is at best a dangerous one, even in the hands of the masters, let alone the average student. This is sufficiently well illustrated by the errors into which Professor Bowser himself has fallen; and he should read the scoring that Clausius gave his mathematical critics on their use of infinitesimals. He will find that he is in good company. Most anything can be proved to the satisfaction of the average student, just as Professor Bowser establishes the differentials of the trigonometric functions. Thus, by trigonometry,

$$\begin{aligned} \sin(x + dx) + \cos(x + dx) &= \sin x \sqrt{2} \cos\left(\frac{\pi}{4} + dx\right) \\ &\quad + \cos x \cos dx + \cos x \sin dx \\ &= \sin x + \cos x + \cos x dx, \end{aligned}$$

since $\sqrt{2} \cos\left(\frac{\pi}{4} + dx\right) = 1$, $\cos dx = 1$, $\sin dx = dx$.

Hence $d(\sin x + \cos x) = \cos x dx$, a false result.

Professor Bowser is more fortunate than the critics of Clausius, since he happens upon a final result that is correct; but, farther along, this good luck deserts him, in the case of a carefully-worked example (Calc., ex. 8, p. 325). Another case is ex. 8, p. 338. In view of these facts, I hope Professor Bowser will revise his demonstrations and eulogy on infinitesimals, to the decided improvement of his valuable book.

A. S. HATHAWAY,

Professor of Mathematics, Rose Polytechnic Institute.
Terre Haute, Ind., Jan. 28.

Some Additional Remarks on Maya Hieroglyphic Writing.

IN a former communication, replying to some objection brought forward by Professor Thomas, I noticed that in the numerals, composed of straight lines and dots, which are seen accompanying the hieroglyphs of the Maya inscriptions, the one dot of the numbers 1, 6, 11, 16 always is supported and framed by two ornamental signs filling up the space, while no ornamental sign is seen between the two dots of the numbers 2, 7, 12, 17. I noticed this for a Copan Stela published by Alfred Maudsley (see the Figs. 1-16 in my former paper). I may add that the same applies to the inscriptions of the Palenque tablets, only that here the two dots of the number 2, like the one dot of the number 1, are framed by two ornamental signs, while the two dots of the numbers 7, 12, and 17, as a rule, are standing alone. I wish to state that although prevailing in most cases, this rule may allow some exceptions. Alfred Maudsley, page 39 of the text, gives drawings of the numerals, where an ornamental sign, similar to the two ornamental signs of the numbers 1 and 6, is seen between the two dots of the numbers 2 and 7. Maudsley does not mention where he has taken these figures. But, for instance, on the cross-tablet 1, of Palenque, in the hieroglyph V. 17, designating

the twelfth day of the month Kayab, a somewhat peculiar ornamental sign, composed of two nooks, is seen between the two dots of the number.

In connection with these facts, I wish to mention that there really exists an instance of a cross between the two dots of a number in Dresden Codex 46, already mentioned by Professor Förstemann in *Zeitschrift für Ethnologie*, 23 (1891), p. 149, that, unfortunately, I had overlooked.

DR. SELER.

Steglitz, Germany, Jan., 1893.

Languages of the Gran Chaco.

I WAS very much gratified to see that Dr. Brinton thinks well of my intention to publish all the material I can get hold of connected with the languages of the Gran Chaco. The following facts may be of interest to him and other Americanists on your side of our continent.

1. Dr. Brinton is quite right in giving the name of "Guaycurú" to the Abipone and other cognate dialects. The root word is *ary*, which simply means "a fierce savage." *Gu* and *curú* are simply particles.

2. The linguistic library of the La Plata Museum will comprise two series: First, the Guaycurú; second, the non-Guaycurú group.

The Guaycuru Group

a. MOCOBI. Father Tavolini's MS. faithfully reproduced; a grammar founded on same, with a preliminary discourse and other papers. An English version of the grammar.

b. TOBA. Father Barcena's MS. complete, with supplementary vocabularies by Carranza, Pelleschi, the editor, and others. A preliminary discourse on the language. An English translation of F. Barcenas Quires.

c. ABIPON. Father Dobrizhoffer's chapters on this dialect, supplemented from MSS. supposed to be Father Brigniel's, with a preliminary discourse, and most important vocabulary.

d. LENGUA. Cerviño's MS. vocabulary. Evidently a cognate dialect, with Mansfield's Payaguá. Preliminary discourse on the same subject..

e. GUAYCURÚ. An essay on Castelnan and Gibü's vocabularies.

Non-Guaycuru Group.

a. A reproduction of Father Machoni's work on the Lule language, with an essay on the suffixing dialects of the Chaco.

b. An essay on the Vilela and Chulupí dialects, to accompany Pelleschi's vocabulary.

c. Mataco. Pelleschi's grammar and vocabularies, with notes and preliminary discourse by the editor.

d. Possible numbers in Mataguays, Nocten (Mataco dialects), and Chiriguano (a Guarani dialect).

Dr. Moreno, director of the La Plata Museum, is doing his best to push this work forward. SAMUEL A. LUFONE QUEVEDO.

Pilciao, Catamarca, Argentine Republic, Dec. 18.

Controversies in Science.

IT might be well for scientific controversialists to bear in mind that undue heat is an indication — as in mechanics — of want of that balance that should constitute a judicial mind. The world generally views with amusement the frothy utterances of the man on the wrong side who finds himself hard pressed by reiterated facts, and judges him to be in the wrong, frequently, by his language, when he may be correct entirely. One without any knowledge of the facts of the present controversy between a few persons connected with the U. S. Geol. Survey — a survey at present under a cloud from the disbelief of Congress as to its needs and usefulness — and the upholders of "palæolithic man," would naturally incline to the side taken by Professor Wright, merely from the perfect courtesy and evenness of temper which he has preserved under exceptional circumstances. It is seldom in the course of controversy that a clergyman of good character has been so bespattered with epithets, innuendoes, and charges that would render him — if true — worthy of abrupt expulsion from any position of trust, or from any decent religious body.